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1 ADJUSTABLE GATE HINGE AND LATCH, AND SYSTEM

2 This application claims the benefit of U.S.
3 Provisional Patent Application No. 60/248,930, filed
4 November 15, 2000.

5 FIELD OF THE INVENTION

6 This invention relates generally to hinges and
7 latches for use with fence gates and more particularly
8 relates to hinges and latches that are adjustable for
9 movement horizontally in a direction perpendicular to the
10 plane of the gate to compensate for movement of the gate
11 posts along the same direction.

12
13 BACKGROUND OF THE INVENTION

14 Fences made of wood or metal tend to be rather
15 heavy. One concern for the hinges holding one side of a
16 fence gate to a fence post and latch mechanism holding
17 the other side of the gate to another fence post is the
18 sagging of the gate and/or the fence posts as a result of
19 the weight of the gate itself. To compensate for this,
20 it has been recognized as desirable to allow adjustments
21 to be built into the hinge, as shown in U.S. Patent
22 No. 60,808. Most efforts have generally gone into
23 providing adjustability in the gate latch to compensate
24 for sagging. For example, U.S. Patent Nos. 3,433,518,
25 4,305,611, 5,498,041, and 5,655,801 show different ways
26 of providing adjustability or adaptability in the latch
27 such as by providing camming surfaces to move the gate up
28 and down as the latch bar slides into the latch frame to
29 bring the position of the frame back to the desired
30 position of the frame back to the desired position when
31 the gate is latched. Other efforts provided vertical
32 adjustability to compensate or adjust for a sagging gate
33 and its movement in a vertical plane.

1 However, with modern fencing, it has been found that
2 adjustability of this type is not of the primary
3 importance. Fences and gates can be built from materials
4 as polyvinyl chloride or other plastic, which are
5 lightweight and provide a high degree of rigidity so that
6 the shape of the gate itself does not tend to change over
7 a period of time. However, this has created a somewhat
8 different problem. The posts on each side of the gate
9 may tend to move in a direction perpendicular to the
10 plane of the gate as may happen from loads of snow pushed
11 against them by snow plows or other impacts even though
12 the posts are set in the ground with concrete for a
13 sufficient depth to go below the frost line.

14 If the gate posts are perfectly vertical, the hinges
15 may be mounted on a perfectly vertical axis so that the
16 gate hinge position is neutral, with a tendency neither
17 to open nor close by the weight of the gate. However, it
18 may be considered desirable to provide a positioning such
19 that the gate tends to be self-closing or self-opening.
20 To provide such positioning requires movement of at least
21 one hinge axis to allow the gate to swing in the desired
22 direction.

23 Movement of the hinge axes may result in a
24 misalignment at the gate latch. The misalignment may be
25 such that the latch may become difficult to operate
26 because, as a result of the change in hinge position, the
27 latch either may not allow the gate to close fully or may
28 allow it to close past the desired middle position with
29 respect to the adjacent post.

31 SUMMARY OF THE INVENTION

32 In accordance with one aspect, the present invention
33 provides a novel hinge and latch arrangement that permits
34 regulation and adjustment of a gate with respect to the

1 gate posts by allowing adjustable movement in a direction
2 perpendicular to the plane of the gate.

3 In accordance with another aspect of the present
4 invention, the hinge is provided such that the location
5 of a hinge pivot point can be adjusted and moved in a
6 direction perpendicular to the plane of the gate by
7 loosening a single fastener screw and sliding a portion
8 of the hinge to a desired position after which the screw
9 can be retightened to clamp the movable slide between a
10 mounting bracket and a post.

11 In accordance with another aspect of the present
12 invention, the hinge can be inverted to be used on either
13 of two posts associated with the gate, and when mounted
14 on an end surface face of a post, the hinge can be
15 arranged to have a side extension to either the front or
16 the back surface of the post.

17 In accordance with another aspect of the present
18 invention, the latch unit is provided such that a latch
19 pin can be adjustably moved horizontally to and from the
20 gate to allow the gate to be centered with respect to the
21 adjacent post when the latch unit is closed.

22 In accordance with another aspect of the present
23 invention, the latch unit can be inverted and used on
24 either side of the gate without modification.

25 In accordance with another aspect of the present
26 invention, the latch unit is easily adaptable to allow
27 actuation of the latch unit from the side of the gate
28 opposite the latch pin.

29 In accordance with still another aspect, the present
30 invention provides an adjustable gate hinge and latch
31 system for a fence gate of a fence. A hinge
32 interconnects the gate to a first post of the fence. The
33 hinge supports the gate and permits pivoting movement of
34 the gate relative to the first fence post. A latch unit
35 secures the gate, to a second post of the fence, in a

1 closed position of the gate. At least one of the hinge
2 and the gate unit has an arrangement to permit adjustment
3 of the gate relative to the fence in a direction
4 perpendicular to a plane of the fence. The arrangement
5 includes two components that are relatively movable along
6 the direction perpendicular to a plane of the fence and
7 that are secured to each other subsequent to the movement
8 along the direction perpendicular to the plane of the
9 fence.

10 In accordance with still another aspect, the
11 present invention provides an adjustable gate hinge that
12 has an arrangement to permit adjustment of the gate
13 relative to the fence in a direction perpendicular to a
14 plane of the fence.

15 In accordance with still another aspect, the
16 present invention provides an adjustable latch unit that
17 has an arrangement to permit adjustment of the gate
18 relative to the fence in a direction perpendicular to a
19 plane of the fence.

20

21 BRIEF DESCRIPTION OF THE DRAWINGS

22 Further features and advantages will become apparent
23 to those skilled in the art upon reading the following
24 detailed description taken with the accompanying
25 drawings, in which:

26 Fig. 1 is a perspective view of a gate mounted
27 between a pair of gate posts using hinges and a latch
28 unit in accordance with the present invention;

29 Fig. 2 is an enlarged perspective view showing
30 detail of one of the hinges shown in Fig. 1;

31 Fig. 3 is a cross-section view taken on lines 3-3 of
32 Fig. 2 with certain parts removed for brevity;

33 Fig. 4 is an elevation view of the hinge and a
34 fragment of a post for reference, with the hinge assembly
35 in an open position;

Fig. 5 is an elevation view of the hinge from the side opposite that shown in Fig. 4, with the post removed for clarity;

Fig. 6 is an enlarged perspective view showing details of the gate latch unit of Fig. 1; and

Fig. 7 is an enlarged perspective view of the gate latch unit showing the other side of the latch unit from that shown in Fig. 6.

DETAILED DESCRIPTION OF AN EXAMPLE EMBODIMENT

Referring to the drawings in greater detail, Fig. 1 shows an example gate 10 mounted between two posts, such as hinge post 11 and latch post 12. Each of the posts 11, 12 has a cap 13 at an upper end. The gate 10 as shown may be constructed from an upper rail 14 and lower rail 15 as well as a diagonal reinforcing rail 16. On the one face of the gate suitable pickets or spindles 18 (Fig. 2) are secured to the rails 14, 15 to complete the structure of the gate itself.

In one example, all of the above parts are formed from extrusions of polyvinyl chloride and are held together either by suitable adhesives or mechanical fasteners. While the upper and lower rails 14 and 15, and pickets 18 may be hollow, it may be desirable to have the rails reinforced by wooden inserts (see Fig. 3) to better receive screw fasteners for hinges and a latch unit, as will be described in greater detail hereinafter. Also, each of the posts 11, 12 may be reinforced by an inner wood member extending into the ground, both to provide increased rigidity for mounting the gate and to receive the fasteners. The caps 13 (Fig. 1) add finish appearance and protect the inner wood members located within the posts 11, 12.

The gate 10 is mounted on the hinge post 11 by means of upper and lower hinges 21 and 22 that are identical in

1 construction. For brevity, the upper hinge 21 will be
2 described with the understanding that the description is
3 applicable to the lower hinge 22.

4 The hinge post 11, which is typically square in
5 cross section, has a face surface 24 extending generally
6 parallel to the fence and the gate 10 and a side
7 surface 25 (see Fig. 2) directly facing the gate.

8 A hinge mounting bracket 27 of the upper hinge 21 is made
9 of metal or other suitably strong material. The mounting
10 bracket 27 is in the shape of a right angle having a face
11 leg 29 abutting the face surface 24 and a side leg 30
12 abutting the side surface 25. The face leg 29 is of
13 normal construction being flat and arranged with openings
14 to receive fasteners 32 that extend into the hinge
15 post 11.

16 The side leg 30 of mounting bracket 27 is of
17 different construction from the face leg 29. The side
18 leg 30 has a pair of parallel, spaced horizontal slots
19 34A, 34B (Fig. 4) that define a center section 36 and
20 upper and lower edge sections 37A, 37B. These edge
21 sections 37A, 37B have openings 35 to receive
22 fasteners 38 (not shown in Fig. 4, shown in Fig. 2) to
23 secure the side leg 30 of the mounting bracket 27 to the
24 side surface 25 of hinge post 11. The center section 36
25 (Fig. 3) is raised to be out of contact with the side
26 surface 25. A fastener receiving hole 39 (Fig. 4)
27 extends through the center section 36. A screw
28 fastener 45 (not shown in Fig. 4, shown in Fig. 3) passes
29 through the hole 39 into the hinge post 11.

30 A slide member 41 (Fig. 5) is made of metal or other
31 suitable material. The slide member 41 has a center
32 section 42 positioned between the side surface 25 of the
33 hinge post 11 (Fig. 4) and the raised center section 36
34 of the upper hinge 21. The center section 36 of the side
35 leg 30 is spaced far enough away from the post side

1 surface 25 that when the edge sections 37A, 37B are
2 secured to the hinge post 11, the slide member 41
3 (Fig. 5) can be moved back and forth horizontally for
4 hinge adjustment purposes.

5 The center section 42 of slide member 41 has an
6 elongated slot 44 in alignment with the hole 39 in the
7 center section 36 so that the screw fastener 45 (Fig. 3)
8 passes through the hole 39 and slot 44 into the hinge
9 post 11. When the fastener 45 is tightened, the slide
10 member 41 is clamped in place by the center section 36.
11 When the fastener 45 is loosened, the slide member 41 is
12 free to move a distance determined by the length of
13 slot 44.

14 The slide member 41 has a pair of ears 46A, 46B
15 (Fig. 4) projecting from the upper and lower edges of
16 center section 42 and extending perpendicular to the
17 center section. The ears 46A, 46B extend horizontally
18 through the slots 34A, 34B, respectively, past the center
19 section 36 of the slide leg 30. Each of the
20 ears 46A, 46B has an opening 47 therein. A hinge pin 48
21 extends vertically through the openings 47 of the
22 ears 46A, 46B. In one example, the hinge pin 48 is non-
23 rotatably connected to the slide member 41, either by
24 being press-fit into the openings 47 of the ears 46A, 46B
25 or by having the ends of the hinge pin formed to lock the
26 hinge pin in place.

27 A hinge strap 49 (Fig. 5) is made from metal or
28 other suitable material. An angled portion 50 (Fig. 3) of
29 the hinge strap 49 extends from a generally flat
30 portion 52. A portion extending from the angled
31 portion 50 is rolled into a cylinder to form an eye 51
32 that journals the hinge strap 49 on the hinge pin 48.

33 The flat portion 52 (Fig. 2) extends along the
34 adjacent upper rail 14 of the gate 10 and has elongated
35 slot openings 53 (Fig. 5) to receive screws 54 (Fig. 3)

1 that extend into the adjacent rail to hold the gate 10
2 relative to the hinge strap. If desired, suitable
3 ridges 55 may be stamped in the flat portion 52 to
4 provide additional stiffness. The elongated openings 53
5 allow the hinge strap 49 to be positioned (e.g.,
6 horizontally) with respect to the adjacent upper rail 14
7 so that the entire gate 10 can be moved to and from the
8 hinge post 11 in the plane of the gate.

9 On the other hand, the construction and interaction
10 of the mounting bracket 27 and slide member 41 provide
11 for movement of the gate 10 in a direction perpendicular
12 to the plane of the gate as may be required for balancing
13 the mounting of the gate. The movement of the slides 41
14 of the two hinges 21, 22 (Fig. 1) provides that the
15 gate 10 can be balanced in a neutral position or by
16 movement of the slides to a different position, the gate
17 can be biased by its weight to either swing toward the
18 open position or the closed position as desired. The
19 movement of the slide member 41 can provide the proper
20 hinging action, even if the hinge post 11 is moved so it
21 is no longer exactly perpendicular to the ground, as may
22 happen if an excessive force is applied to the post for
23 any reason.

24 The hinges 21, 22 can be used on either the left
25 side or the right side of the gate 10 because the hinges
26 are symmetrical about a horizontal centerline. As a
27 result of the angled portion 50 (Fig. 3), the hinge
28 strap 49 is able to rotate through a full range
29 (e.g., 180 degrees) around the hinge pin 48 to allow the
30 gate 10 to fold back against the fence portion next to
31 the hinge post 11. Attendant with such features, the
32 hinges 21, 22 can be mounted on either the inside or the
33 outside of the hinge post 11, depending upon which
34 direction is desired for the opening movement.

1 A latch unit 60 is positioned on the other side of
2 the gate 10 from the hinges 21, 22. The latch unit 60
3 and latches the gate 10 to the latch post 12 and operates
4 in a manner which, combined with the structure of the
5 hinges 21 and 22, only allows the gate to open in one
6 direction from the closed position.

7 The latch unit 60 (Fig. 6) includes a handle 61 that
8 is made of metal or other suitable material. The handle
9 61 is mounted horizontally on the upper rail 14 and has a
10 flat distal end portion 62 located away from the latch
11 post 12. The end portion 62 is engaged against the upper
12 rail 14.

13 An angled grip portion 64 extends from the end
14 portion 62, and may be formed with a longitudinal
15 indentation 65 to provide a rounded gripping surface on a
16 side facing the gate 10. The grip portion 64 extends
17 outward from the upper rail 14 to a bend 67. From the
18 bend 67, a leg portion 69 of the handle 61 extends back
19 toward the upper rail 14 of the gate 10. At an end of
20 the leg portion 69, a bent mounting flange 71 abuts the
21 upper rail 14.

22 Mounting holes (not visible in the Figures) extend
23 through the end portion 62 and the mounting flange 71.
24 Suitable screws 72 extend through the holes in the end
25 portion 62 and the flange 71 to hold the handle 61 in
26 position on the gate 10.

27 The leg portion 69 has a pair of horizontally
28 aligned, elongated slots 74 (Fig. 7) as well as a hole or
29 opening 76 at the bend 67. A latch pin 79 of the latch
30 unit 60 is made of metal or suitable material. The latch
31 pin 79 has a shank 81 (Fig. 6) extending through the
32 hole 76 along the inside of the leg portion 69 of the
33 handle 61. At least a portion of the shank 81 is
34 flattened to provide a flattened portion 82 that enhances

1 abutting contact with the leg portion 69 of the handle 61.
2 Screws 84 (Fig. 7) extend through the slots 74 from
3 the outer surface of the leg portion 69 and through
4 suitable opening (not visible in the drawings) in the
5 flattened portion 82 of the shank 81. The screws 84
6 receive nuts 85 (Fig. 6). When the nuts 85 are
7 tightened, the shank 81 is clamped tightly to the inside
8 of the leg portion 69. When the nuts 85 are loosened,
9 the screws 84 are movable along the slots 74 and permit a
10 limited amount of horizontal movement of the latch pin 79
11 with respect to the handle 61.

12 The latch pin 79 has a latch bar portion 87
13 extending at a right angle to the shank 81 parallel to
14 the upper gate rail 14. The latch bar portion 87
15 terminates in an enlarged ball end 88 (Fig. 7).

16 The latch unit 60 includes a latch mounting
17 bracket 91 attached to latch post 12. The mounting
18 bracket 91 is made of metal or suitable material. The
19 mounting bracket 91 includes an inner segment 93 and a
20 parallel outer segment 95, connected together at a distal
21 end by a bend 96. The inner segment 93 and the outer
22 segment 95 are a spaced distance apart determined by the
23 shape of the bend 96.

24 The inner segment 93 extends partially along an
25 adjacent side surface 94 (Fig. 6) of the latch post 12.
26 A flange portion 98 (Fig. 7) extends from the outer
27 segment 95 and extends along a face surface 97 of the
28 latch post 12. Suitable screws 99 extend through the
29 flange portion 98 and inner segment 93 (not readily
30 visible in Fig. 7) to mount the latch mounting bracket 91
31 in place on the latch post 12. At the distal end, the
32 inner and outer segments 93 and 95 are cut away to form a
33 generally V-shaped groove 101 extending back from the
34 bend 96. The V-groove 101 terminates in a rounded

1 root 102 having the same radius as the latch bar
2 portion 87 of the latch pin 79.

3 Pivot holes 103 and 104 extend through the inner and
4 outer segments 93 and 95, respectively (see Figs. 6
5 and 7). The pivot holes 103 and 104 are in axial
6 alignment with each other and are spaced a distance back
7 from the V-groove 101. A pair of lock holes 105 and 106
8 (see Figs. 6 and 7) extend through the inner and outer
9 segments 93 and 95, respectively. The lock holes 105
10 and 106 are in axial alignment with each other and are
11 located above the pivot holes 103 and 104. A lock (not
12 shown) can be received in the first pair of lock holes to
13 prevent the gate 10 from being opened. Another pair of
14 lock holes (only 107 visible, Fig. 7) extend through the
15 inner and outer segments 93 and 95. As shown in the
16 mounting configuration of the Figures, the other pair of
17 lock holes is below the pivot holes 103 and 104. If the
18 latch unit 60 were mounted for an oppositely opening
19 gate, the second pair of holes could be employed for
20 receiving a lock. As such, the latch mounting bracket 91
21 is symmetrical about a horizontal centerline.

22 A catch member 108 has a center pivot hole (not
23 visible). A pivot pin 110 (Fig. 6) extends through the
24 pivot hole of the catch member and into the pivot
25 holes 103 and 104. The catch member 108 is positioned
26 between the inner and outer segments 93 and 95 of the
27 latch mounting bracket 91 and is pivotally mounted on the
28 pivot pin 110 relative to the latch mounting bracket.

29 The catch member 108 is symmetrical about a
30 horizontal centerline passing through the pivot hole to
31 have an upper arm 111 and a lower arm 112 extending above
32 and below, respectively, the latch mounting bracket 91.
33 The upper arm 111 has a curved upper hook 115 defining an
34 upper notch opening 114. The lower arm 112 has a curved
35 lower hook 117 defining a lower notch opening 116. The

1 arms 111, 112 curve toward the same direction, away from
2 the latch post 12.

3 The center of gravity of the entire catch member 108
4 is located between the pivot pin 110 and the root 102 of
5 V-groove 101 due to the curvature of the upper and lower
6 arms 111 and 112 in the same direction. In the absence
7 of any applied force, the upper arm 111 pivots in the
8 direction away from the latch post 12. With the upper
9 arm 111 pivoted away from the latch post 12, the upper
10 arm hook 115 extends over and encloses the latch bar
11 portion 87 when the gate 10 is in the closed position.
12 This arrangement allows the latch unit 60 to be opened,
13 thus permitting the gate 10 to be opened, by merely
14 manually raising the projecting end of the upper arm 111.

15 Both the upper and lower hooks 115 and 117 have a
16 curved outer surface that cooperates with the V-
17 groove 101 to allow the catch member 108 to pivot open
18 when the latch pin 79 is moved into the V-groove 101.
19 With the latch bar portion 87 in the V-groove 101, the
20 catch member 108 pivots back downwardly so that the latch
21 pin 79 is secured within the root 102 of V-groove 101 and
22 within the notch opening 114 on the upper hook 115.

23 Moreover, with the latch mounting bracket 91 and
24 the catch member 108 both vertically symmetrical (i.e.,
25 symmetrical about a horizontal line) about the pivot
26 connection between them, the latch unit 60 is easily
27 adapted for reversal and use for an oppositely swinging
28 gate. Thus, the latch unit 60 can be used on either the
29 right side or the left side of the gate 10. This feature
30 is in corollary with the feature that the hinges 21, 22
31 can be used on either the left or right side of the
32 gate 10.

33 To allow the gate 10 to be easily opened from the
34 side opposite that having the bulk of the latch unit 60,
35 a release bar 119 may be provided. The release bar 119

1 is located adjacent to the side surface 94 of the latch
2 post 12, and is held in place by a bracket 123 secured to
3 the side surface. The release bar 119 is located below
4 the bulk of the latch unit 60, and is connected by a
5 pivot bolt 121 to an end of the lower arm 112 of the
6 catch member 108. The release bar extends to the
7 opposite side of the fence.

8 A flat end 124 may be provided on the release
9 bar 119 (i.e., on the opposite side) to permit easy
10 manipulation. The release bar 119 is manually actuatable
11 from the opposite side. In operation, the release
12 bar 119 slides relative to the latch post 12 and
13 bracket 123 to transmit force (i.e., a push force) to the
14 lower arm 112. The force pivots the catch member 108
15 upward. The pivot bolt 121 permits some relative
16 movement between the release bar 119 and the catch
17 member 108.

18 Associated with the aspect of each of the hinges
19 (e.g., 21) being adjustable to allow a certain amount of
20 horizontal movement of the hinge pin 48 with respect to
21 the adjacent hinge post 11, the latch unit 60 also
22 accommodates horizontal movement. Reposition of the
23 latch pin 79 with respect to the handle 61, by releasing
24 the screws 84 and retightening them when the latch pin is
25 in the desired position, provides the horizontal
26 adjustment aspect. This arrangement allows a unique
27 adjustment for the gate 10 at both the hinges 21, 22 and
28 the latch unit 60 to permit adjustable movement of the
29 gate with respect to the posts 11, 12 in a horizontal
30 direction or one that is perpendicular to the plane of
31 the gate.

32 From the above description of the present invention,
33 those skilled in the art will perceive improvements,
34 changes, and modifications. Such improvements, changes,

- 1 and modifications within the skill of the art are
- 2 intended to be covered by the appended claims.